

What is claimed is:

[Claim 1] A self-cleaning chlorine generator that forms a part of a circulation system for water in a main body of water, comprising: an electrolytic chamber; said electrolytic chamber having an inlet and an outlet; a circulation pump adapted to pump water from a main body of water to said inlet and through said electrolytic chamber;

said outlet of said electrolytic chamber being in fluid communication with a return line that returns water to said main body of water; a control means for isolating the electrolytic chamber from water in said circulation system and in said main body of water; a plurality of electrolytic plates disposed within said electrolytic chamber; a reservoir containing a pH-reducing agent disposed in selective fluid communication with said electrolytic chamber; an infusion means positioned between said reservoir and said electrolytic chamber; said control means controlling flow of said pH-reducing agent from said reservoir through said infusion means and into said electrolytic chamber; said control means adapted to enable said pH-reducing agent to flow into said electrolytic chamber to clean mineral deposits from said anode and cathode when said circulation pump is not operating; and said control means adapted to prevent flow of said pH-reducing agent into said electrolytic chamber when said circulation pump is operating.

[Claim 2] The self-cleaning chlorine-generator of claim 1, further comprising:

said control means including a normally closed one-way valve and a valve actuator connected to said normally closed one-way valve; said valve actuator adapted to open and close said normally closed one-way valve; and said control means including a signal-generating means that generates and sends an "open" signal to said actuator means when said normally closed one-way valve is to be opened to release a pH-reducing agent from said reservoir into said electrolytic chamber; and said control means including a signal-generating means that generates and sends a "close" signal to said actuator means when said normally closed one-way valve is to be closed.

[Claim 3] The self-cleaning chlorine-generator of claim 1, further comprising:

a flow switch positioned between said circulation pump and said electrolytic chamber; a flow-sensing means positioned within said flow switch; said flow-sensing means including a signal-generating means that generates and sends a signal to said actuator means that prevents opening of said normally-closed one-way valve when said circulation pump is operating; and said flow-sensing means including a signal-generating means that generates and sends a signal to said actuator means that effects opening of said normally-closed one-way valve when said circulation pump is not operating.

[Claim 4] The self-cleaning chlorine-generator of claim 1, further comprising:

said electrolytic chamber having a vertical orientation where said inlet is below said electrolytic chamber and said outlet is above said electrolytic chamber;
a check valve positioned between said circulation pump and said inlet of said electrolytic chamber; said check valve being open to allow flow of water from said main body of water into said electrolytic chamber when said circulation pump is operating; said check valve being closed to prevent flow of water from said electrolytic chamber to said main body of water when said circulation pump is not operating; and a vacuum breaker disposed in said return line, downstream of said outlet of said electrolytic chamber, to enable water to drain back into said main body of water to ensure isolation of said electrolytic cell when said circulation pump is not operating.

[Claim 5] The self-cleaning chlorine-generator of claim 1, further comprising:

said electrolytic chamber having a horizontal orientation; said inlet and said outlet each having an "S"-shape and being horizontally disposed so that said electrolytic chamber is positioned at an elevation below a lowermost surface of said inlet and outlet to ensure that the electrolytic plates inside said electrolytic chamber are immersed in water even when all water in adjacent parts of the system has drained into the main body of water; a vacuum breaker disposed in said inlet, upstream of said outlet of said electrolytic chamber, to enable water to drain back into said main body of water to ensure isolation of said electrolytic cell when said circulation pump is not operating.

[Claim 6] The self-cleaning chlorine generator of claim 1, further comprising:

said control means including a timer;
said timer adapted to generate and send an "open" signal to said actuator means at predetermined times; said timer adapted to generate and send a "close" signal to said actuator means at predetermined times so that said normally closed valve is closed upon expiration of a predetermined amount of time; said circulation pump being in a deactivated state when said timer sends said "open" and "closed" signals to said actuator means so that pH-reducing agent admitted into said electrolytic chamber dwells within said electrolytic chamber until said circulation pump is activated.

[Claim 7] The self-cleaning chlorine generator of claim 1, further comprising:

a pH sensor disposed in said body of water, said pH sensor including a signal-generating means adapted to generate and send an "open" signal to said actuator means when said sensor detects that the pH of said body of water is below a predetermined threshold, said "open" signal causing said actuator means to open said normally closed one-way valve; said signal-generating means also adapted to generate

and send a "close" signal to said actuator means upon expiration of a predetermined amount of time, said "close" signal causing said actuator means to close said normally closed one-way valve; said circulation pump being in a deactivated state when said signal generating means sends said "open" and "closed" signals to said actuator means so that pH-reducing agent admitted into said electrolytic chamber dwells within said electrolytic chamber until said circulation pump is activated; whereby said pH-reducing agent in said electrolytic chamber cleans mineral deposits from said anode and cathode when said circulation pump is not operating; and whereby said pH-reducing agent in said electrolytic chamber is introduced into said body of water when said circulation pump is activated.

[Claim 8] The self-cleaning chlorine generator of claim 1, further comprising:

said reservoir being mounted at a preselected elevation above said electrolytic chamber so that pH-reducing agent in said reservoir flows from said reservoir into said electrolytic chamber under influence of gravity when said normally closed one-way valve is open.

[Claim 9] The self-cleaning chlorine generator of claim 1, further comprising:

said reservoir having an open top; a closure means adapted to close said open top; said closure means having an inner lid and an outer lid disposed in vertically spaced apart relation to said inner lid; a first pinhole formed in said inner lid, said first pinhole having a one-way flap; a second pinhole formed in said outer lid, said second pinhole having a one-way flap; said first and second pinholes cooperating with one another to admit ambient air into said reservoir so that said pH-reducing agent may flow out of said reservoir when said normally closed one-way valve is open; said first and second pinholes being misaligned with respect to one another, thereby cooperating with one another to inhibit splashing of said pH-reducing agent from said reservoir when said reservoir is dropped or bumped.

[Claim 10] The self-cleaning chlorine generator of claim 1, further comprising:

said pH-reducing agent being hydrochloric acid.

[Claim 11] A method for cleaning a chlorine generator, comprising the steps of:

providing an electrolytic chamber having an inlet and an outlet; pumping water from a main body of water through said electrolytic chamber; positioning a plurality of electrolytic plates within said electrolytic chamber; positioning a reservoir containing a pH-reducing agent in selective fluid communication with said electrolytic chamber; positioning an infusion means between said reservoir and said electrolytic chamber;

controlling flow of said pH-reducing agent from said reservoir through said infusion means and into said electrolytic chamber so that said pH-reducing agent flows into said electrolytic chamber to clean mineral deposits from said electrolytic cell when said circulation pump is not operating; and preventing flow of said pH-reducing agent into said electrolytic chamber when said circulation pump is operating.

[Claim 12] The method of claim 11, further comprising the steps of: providing a normally closed one-way valve and a valve actuator connected to said normally closed one-way valve; adapting said valve actuator to open and close said normally closed one-way valve; and generating and sending an "open" signal to said actuator means when said normally closed one-way valve is to be opened to release a pH-reducing agent from said reservoir into said electrolytic chamber; and generating and sending a "close" signal to said actuator means when said normally closed one-way valve is to be closed.

[Claim 13] The method of claim 11, further comprising the steps of: positioning a flow switch having a flow-sensing means between said circulation pump and said electrolytic chamber; adapting said flow-sensing means to generate and send a signal to said actuator means that prevents opening of said normally-closed one-way valve when said circulation pump is operating; and adapting said flow-sensing means to generate and send a signal to said actuator means that effects opening of said normally-closed one-way valve when said circulation pump is not operating.

[Claim 14] The method of claim 11, further comprising the steps of: orienting said electrolytic chamber in a vertical disposition so that said inlet is below it and said outlet is above it; positioning a check valve between said circulation pump and said inlet of said electrolytic chamber; opening said check valve to allow flow of water from said main body of water into said electrolytic chamber when said circulation pump is operating; and closing said check valve to prevent flow of water from said electrolytic chamber to said main body of water when said circulation pump is not operating.

[Claim 15] The method of claim 11, further comprising the steps of: orienting said electrolytic chamber, said inlet and said outlet in a horizontal position; forming said inlet and outlet so that they have an "S"-shape; positioning said electrolytic chamber, said inlet and said outlet so that said electrolytic chamber is positioned at an elevation below lowermost surfaces of said inlet and outlet to insure immersion of the electrolytic plates in said electrolytic chamber; positioning a drop-regulating chamber between said reservoir and said electrolytic chamber and adapting said drop-regulating

chamber to add said pH-reducing agent to said electrolytic chamber at a preselected, drop-by-drop rate.

[Claim 16] The method of claim 15, further comprising the steps of: providing a vacuum breaker in fluid communication with said inlet so that air from said vacuum breaker passes by the drop-regulating chamber so that air displaces the water in the drop-regulating chamber to enable the drops of the pH-reducing agent to be gravity fed into the electrolytic chamber.

[Claim 17] The method of claim 11, further comprising the steps of: providing a timer adapted to generate and send an "open" signal to said actuator means at predetermined times; adapting said timer to generate and send a "close" signal to said actuator means at predetermined times so that said normally closed valve is closed upon expiration of a predetermined amount of time; and deactivating said circulation pump when said timer sends said "open" and "closed" signals to said actuator means so that pH-reducing agent admitted into said electrolytic chamber dwells within said electrolytic chamber until said circulation pump is activated.

[Claim 18] The method of claim 11, further comprising the steps of: positioning a pH sensor in said body of water; adapting said pH sensor to generate and send an "open" signal to said actuator means when said sensor detects that the pH of said body of water is below a predetermined threshold so that said "open" signal causes said actuator means to open said normally closed one-way valve; adapting said pH sensor to generate and send a "close" signal to said actuator means upon expiration of a predetermined amount of time so that said "close" signal causes said actuator means to close said normally closed one-way valve; deactivating said circulation pump when said signal generating means sends said "open" and "closed" signals to said actuator means so that pH-reducing agent admitted into said electrolytic chamber dwells within said electrolytic chamber until said circulation pump is activated; whereby said pH-reducing agent in said electrolytic chamber cleans mineral deposits from said anode and cathode when said circulation pump is not operating; and whereby said pH-reducing agent in said electrolytic chamber is introduced into said body of water when said circulation pump is activated.

[Claim 19] The method of claim 18, further comprising the steps of: introducing said pH-reducing agent during extended "off" periods of said circulation pump to enable cleaning without over-compensation of pH

levels; and calibrating the acid amount depending on the pH readings taken by said pH sensor.

[Claim 20] The method of claim 19, further comprising the steps of: adjusting the pH without letting the acid remain in the cell for an extensive period of time if a cell has been cleaned within a previous ten (10) day period of time.

[Claim 21] The method of claim 20, further comprising the steps of: deactivating said circulation pump, performing an acid infusion, quickly reactivating said circulation pump, and repeating said steps of deactivating said circulation pump, performing an acid infusion, and quickly reactivating said circulation pump until a preselected pH level is attained.

[Claim 22] The method of claim 21, further comprising the steps of: providing an automatic pump that pumps a predetermined amount of acid from said reservoir into said electrolytic cell in a short period of time; pumping said predetermined amount of acid from said reservoir to said electrolytic cell while said circulation pump is operating.

[Claim 23] The method of claim 11, further comprising the steps of: mounting said reservoir at a preselected elevation above said electrolytic chamber so that pH-reducing agent in said reservoir flows from said reservoir into said electrolytic chamber under influence of gravity when said normally closed one-way valve is open.

[Claim 24] The method of claim 11, further comprising the steps of: forming said reservoir to have an open top; providing a closure means adapted to close said open top; providing said closure means with an inner lid and an outer lid disposed in vertically spaced apart relation to said inner lid; forming a first pinhole in said inner lid;

forming a second pinhole in said outer lid; positioning said first and second pinholes relative to one another to admit ambient air into said reservoir so that said pH-reducing agent may flow out of said reservoir when said normally closed one-way valve is open; and misaligning said first and second pinholes with respect to one another, thereby cooperating with one another to inhibit splashing of said pH-reducing agent from said reservoir when said reservoir is dropped or bumped.